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An economic evaluation of management strategies for the Tasmanian rock lobster fishery

by

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Economics and Finance

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Statement of Ethical Conduct

The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

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Abstract

This thesis summarises research on the use of economic approaches in management decision making in the Tasmanian rock lobster fishery. Lobster fisheries globally tend to be well researched and data-rich yet economics is not widely integrated in the management process. This is surprising given that they supply a luxury food market and the entire supply chain is focussed on economic benefit. Lobster fisheries also tend to be resilient to recruitment overfishing (Pollock, 1993), which means the basic management objective of biological sustainability tends to be easily met so there is scope to consider other goals of management.

The use of economics in lobster fishery management is reviewed for fisheries globally. In some lobster fisheries, economic benefit is formally measured and reported as “sustainable economic yield”, which is the long-run, sustainable revenue from harvests minus the costs of harvesting. Reporting of economic yield does not always imply the use of this data in management decision processes, however there are cases where maximum economic yield (MEY) is used as a formal target including in Australian and New Zealand fisheries for *Panulirus cygnus*, *P. ornatus* and *Jasus edwardsii*. Bioeconomic models that combine stock, cost and price information are now being used in lobster fisheries including *P. interruptus*, *P. argus*, *P. cygnus*, *J. edwardsii* and *Homarus americanus* to evaluate regulations such as catch limits, season length, gear limits, and type. Economic theory has also been influential in the evolution of management systems used to constrain catch, in particular through the increased use of market-based and rights-based systems. These systems aim to provide incentives and mechanisms for the transfer of catch to more efficient operators and reward for conservative stock management that protects future harvests. Economic approaches can be used to resolve resource sharing issues in lobster fisheries with most research dealing with recreational and commercial interactions.

A bioeconomic analysis of the Tasmanian rock lobster *Jasus edwardsii* fishery was conducted using a length- and sex-based model. The model was spatially and temporally structured to account for differences in costs of fishing and price. The analysis concluded that the current total allowable commercial catch (TACC) was too high to maximise economic yield and left the industry vulnerable to temporal changes in productivity. Alternative pathways to lower TACCs were explored but although these affected economic yield, differences were minor. Despite operating under ITQ management for over a decade,

the presence of tradeable catch shares was insufficient for industry to motivate changes in the TACC to target MEY. Industry and government were motivated to exercise stewardship, in terms of acting to prevent stock collapse, but were reluctant to accept that economic yield and asset values could increase with lower catches. This bioeconomic analysis of different harvest strategies proved valuable in this debate, demonstrating a need for formal economic analysis as part of the suite of information used for setting TACCs even with the incentives provided by ITQs.

The bioeconomic modeling approach was also used to examine the feasibility of a novel approach to increase productivity in the Tasmanian rock lobster fishery, which was to translocate lobsters from slow growth areas to faster growth areas. Change in stocks in response to translocation was assessed in comparison to the change in TACC that would be required to produce the same effect. These operations appeared viable with strongly positive net present value. When combined with quota management, a translocation of 100,000 lobsters per annum improved most performance measures on a similar scale as would be achieved by a reduction in the total allowable catch of around 10%. This conclusion held broadly across total biomass, legal sized biomass, biomass of large lobsters (>145 mm CL), catch rates and egg production. Economic outcomes were summarised using the discounted cash flow method. Market capitalization of quota units was currently estimated at \$210 million (10507 units @ \$20,000). Ongoing translocations would be expected to increase catch rates so that costs would decline for the same revenue. The discounted cash flow effect of this change on market capitalisation was estimated at an increase of \$47.4 million (\$4515 per unit).

The research presented here led to management reform in the Tasmanian rock lobster fishery. New performance measures and target reference points were developed and adopted by Government, which now target MEY. The industry voted for lower TACCs on the basis of the bioeconomic model outputs presented here and by March 2012 had led to recovery in catch rates, increase in quota lease price, and increase in quota asset values (\$84 million increase in market capitalisation). Translocation has been adopted for a commercial scale trial (100,000 lobsters per annum) with the first release occurring in February 2012. This was funded by industry through a voluntary increase in their license fee, in response to the research presented here.

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